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FUTURE ENVIRONMENTAL LEGISLATION IN THE SOUTH PACIFIC

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Tämä opinäytetyö käsittelee tulevaisuuden ympäristölainsäädäntöä Eteläisellä Tyynellä Valtamerellä. Tarkemmin kyseessä olevat maat ovat: Australia, Uusi-Seelanti, Papua Uusi-Guinea, Fiji, Solomon Saaret, Vanuatu, Marshall Saaret, Micronesia, Kiribati ja Tonga. Opinnäytetyö käsittelee lähinnä ympäristölainsäädäntöä joka koskee Wärtsilää.

Tavoitteena oli saada selville mitä ympäristölainsäädäntö on nyt ja miten se on kehittynyt tähän pisteeseen. Toinen tavoite oli myös saada selville mahdollisia tulevaisuuden näkymiä sekä kansainvälisellä, että alueellisella tasolla. Lisäksi yritin selvittää miten se mahdollisesti vaikuttaa Wärtsilän liiketoimintaan.

Teoria-osiossa ensin käsiteltiin yleinen kansainvälinen ympäristölainsäädäntö, sekä kansainvälisesti ja alueellisesti. Sen jälkeen käytiin läpi Ship Power:ia koskeva ympäristölainsäädäntö ja viimeisenä Power Plants:ia koskeva lainsäädäntö. Työssä luotiin katsaus Ship Power:ia koskevan lainsäädännön nykytilaan ja kehitykseen. Power Plants:ia koskevassa osiossa työ keskittyi lähinnä nykyiseen lainsäädäntöön.

Empiirisessä osiossa yritin saada selville mahdollisia tulevaisuuden näkymiä lainsäädännössä haastattelujen kautta. Haastattelut tehtiin sähköpostin välityksellä. Keskityin haastatteluissa luonnollisesti vain Wärtsilää koskevaan lainsäädäntöön. Haastattelin kuutta erikoisosaajaa, jotka työskentelevät läheisesti ympäristölainsäädäntöä koskevien asioiden kanssa. Neljä haastateltavista työskenteli Wärtsilälle ja kaksi eivät, mutta olivat yhteydessä Wärtsilään töidensä kautta.

Asiasanat	Ympäristö, Lainsäädäntö, Tyyni Valtameri, Power Plants, Ship Power

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ABSTRACT

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This thesis concentrates on future environmental legislation in the South Pacific, more specifically; Australia, New Zealand, Papua New-Guinea, Fiji Islands, Solomon Islands, Vanuatu, Marshall Islands, The Federated States of Micronesia, Kiribati and Tonga. The thesis mainly concerns environmental legislation that affects Wartsila Ltd.

The goal in this thesis was to find out what the environmental law is like now and to examine the possible future prospects of it. The aim was to find out possible outcomes on environmental issues in the region and internationally. Another aim was to try to find out how environmental legislation will affect the business of Wartsila.

In the theoretical study of the thesis environmental law in general both internationally and in the South Pacific region was examined. The environmental law concerning Ship Power and Power Plants also internationally and regionally was discussed. The development of legislation concerning Ship Power and how it is like now was then studied. In the Power Plants Section how the legislation is at present was examined.

In the empirical part of the thesis the possible future outcomes in the legislation was examined through interviews. The interviews were carried out via e-mail. The focus was on legislation that concerns Wartsila. Six experts who work closely with environmental issues were interviewed. Four of the Interviewees worked for Wartsila and two did not, but had close connections with Wartsila through their work.

Keywords Environment, Legislation, South Pacific, Power Plants, Ship Power

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ABBREVIATIONS

AOSIS	Alliance of Small Island States
CBD	Convention on Biological Diversity
CELCOR	Centre for Environmental Law and Community Rights (PNG)
CFC	ChloroFluoroCarbon
CO	Carbon Monoxide
COAG	Council of Australian Governments
COx	Carbon Oxide
CO2	Carbon Dioxide
CSD	The Commission on Sustainable Development
dB	deciBel
EA	Environmental Assessment
ECE	Economic Commission for Europe
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
ELC-PNG	Environmental Law Centre (PNG)
EPHC	Environment Protection and Heritage Council
ESP	ElectroStatic Precipitator
EU	European Union
FAO	Food and Agriculture Organization
FCCC	United Nations Framework Convention on Climate Change
FGD	Flue Gas Desulphurization
FSM	the Federated States of Micronesia
GEF	Global Environment Facility
GHG	Greenhouse Gas
HC	Hydrogen Carbon
HCFC	Hydro-ChloroFluoroCarbon
HFO	Heavy Fuel Oil
IBRD	International Bank for Reconstruction and Development
IDA	International Development Association
IFC	International Finance Corporation
IMDG	International Maritime Dangerous Goods

IMO	International Maritime Organization
LEA	Low Excess Air
LSHFO	Low Sulphur Heavy Fuel Oil
MEPC	Marine Environment Protection Committee
mg^m3	milligrams per cubic meter
mm	millimetre
m/m	many-to-many relationship
NECA	NOx Emission Control Area
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NOx	Nitrogen Oxide
NO2	Nitrogen Dioxide
NZ	New Zealand
NZCEL	the New Zealand Centre for Environmental Law
OECD	Organisation for Economic Co-operation and Development
O2	Oxygen
PM	Particulate Matter
PNG	Papua New-Guinea
ppm	parts per million
SCR	Selective Catalytic Reduction
SECA	SOx/(Special) Emission Control Area
SNCR	Selective Non-Catalytic Reduction
SOx	Sulphur Oxide
SO2	Sulphur Dioxide
SPC	South Pacific Commission
SPREP	South Pacific Regional Environment Programme
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNESCO	United Nations Educational, Scientific and Cultural Organization
USA	United States of America

VOC	Volatile Organic Compound
WB	World Bank
WHO	World Health Organization
WTO	World Trade Organization
µg^m3	micrograms per cubic meter

1. INTRODUCTION

1.1 General

This thesis examines the future of environmental legislation in the South Pacific, more specifically in Australia, New Zealand and the island states in that area. Those islands include Papua New-Guinea, Fiji Islands, Solomon Islands, Vanuatu, Marshall Islands, The Federated States of Micronesia (FSM), Kiribati and Tonga. I will mainly look into the legislation that concerns Wartsila Ship Power and Wartsila Power Plants. Any time I refer to Ship Power or Power Plants in capital letters, I mean these departments of Wartsila. In both of these areas the legislation is mainly international and follows the regulations of international organizations. Legislation concerning Ship Power follows the regulation of International Maritime Organization (IMO). Legislation concerning Power Plants follows the regulation of the World Bank (WB). I will first briefly examine environmental legislation in general, both on international and regional levels. Then I will move on to legislation concerning Ship Power and finally legislation concerning Power Plants. I will examine what the legislation is like now and also say something about how it has developed to this point.

In the research section I will examine how the environmental legislation in that area will progress in the future. This is done mainly through interviews. I interviewed people who work with business related closely to environmental issues. These are mainly political decisions and it is impossible to know for sure how the legislation will progress in the future, but the idea is to find out possible outcomes.

1.2 Definition of Concepts

1.2.1 Ship Power Wartsila

Ship Power Wärtsilä is the leading provider of ship power solutions including engines, generating sets, reduction gears, propulsion equipment, automation and power distribution systems as well as sealing solutions for the marine industry.

Customers of Ship Power are the global or local leading companies within the merchant, offshore, cruise and ferry, navy and special vessel segments. Ship Power commands a strong position in all main marine segments as a supplier of highly rated ship machinery and systems.
(Wartsila, 2009.)

1.2.2 Power Plants Wartsila

Power Plants Wärtsilä is a leading supplier of flexible power plants for the decentralised power generation market. Power Plants offer solutions for base-load power generation, grid stability & peaking, industrial self-generation as well as for the oil and gas industry. Technology leadership, a strong and broad product portfolio, high efficiency and fuel flexibility, plus the ability to offer complete turnkey deliveries worldwide puts Power Plants Wartsila in a unique position in the power plants markets.
(Wartsila, 2009.)

1.2.3 IMO

IMO is an organisation under the United Nations (UN). “The ownership and management chain surrounding any ship can embrace many countries and ships spend their economic life moving between different jurisdictions, often far from the country of registry. There is, therefore, a need for international standards to regulate shipping - which can be adopted and accepted by all. The first maritime treaties date back to the 19th century.
(IMO 2009.)
The Convention which established the IMO was adopted in Geneva in 1948 and IMO first met in 1959. The main task of IMO has been to develop and maintain a comprehensive regulatory framework for shipping and its remit today includes safety, environmental concerns, legal matters, technical co-operation, maritime security and the efficiency of shipping.
(IMO 2009.)

1.2.4 World Bank

The World Bank is a vital source of financial and technical assistance to developing countries around the world. The World Bank is not a bank in the common sense. It is made up of two unique development institutions owned by 186 member countries-the International Bank for Reconstruction and Development (IBRD) and the International Development Association (IDA).
(The World Bank Group 2009.)
The World Bank has set up international standards for environmental issues. Many countries follow these standards if they don't have national standards and receive external funding. These standards are followed mainly by different organisations inside the World Bank. These standards are set in the following areas: Forests and forestry, climate change, corporate responsibility, coastal and marine management, biodiversity and environmental health.

1.3 Research Problem

The problem of the research is to find out the future prospects of international and regional environmental legislation concerning Ship Power and Power Plants. The research is carried out through interviews from experts on the research subject. The interviews are theme interviews. The interviews are done through e-mail, because of the busy schedule of the interviewees. The questions are constructed so the interviewees would have quite free hands on predicting the future of the environmental legislation, but I also try to focus on some specific matters on the questions which I consider important. The questionnaire is divided into four sections to cover both Ship Power and Power Plants and further on to international and regional legislation. First I cover the main points I consider important and then give the interviewees free hands to answer. This is done because the experts might have additional information that I have overlooked.

1.4 Objectives and Limiting of the Research

The research is limited to international environmental legislation and the regional environmental legislation in the South Pacific area. It is also limited to mostly

deal with the legislation that concerns Wartsila, more specifically environmental legislation that concerns Ship Power and Power Plants. The reason for limiting the research to these specific areas is the current situation in the South Pacific, which will be covered later on in this thesis. Also the field of environmental law is much too wide to examine thoroughly in one thesis and that is why I mainly concentrate on the legislation that directly concerns Wartsila, although the first chapter is about general environmental law to give the reader a picture of what it is. Also general environmental legislation of a specific country is examined in the sections that cover regional legislation concerning power plants. This is because there just isn't any national legislation on the matter for the country and the country mostly follows international guidelines.

The objectives of the research are to find out what environmental legislation is now and how it has developed to this point. Another objective was also to find out possible outcomes on the development of the legislation in the future. The aim is not to give exact facts on what will happen, but what might happen. This is, of course, because it is impossible to predict what will happen in detail. Internationally the objective is to find out how the new regulations will be accepted among nations and possible development of the legislation. Regionally the objective is to find out how the current concern of the region, (great concern of the climate change) will affect the progress of environmental legislation. Will there be more national legislation on the regulations and will the national legislation become stricter or will it have no greater effect on the current situation? Ultimately the objective is to obtain important data on planning the development of business for Wartsila in the South Pacific and internationally, because the future of environmental legislation affects the business tremendously.

2. ENVIRONMENTAL LEGISLATION

2.1 General information

In this section I will briefly go through the basics of environmental law. I will first look into what international environmental law is and the main subjects it deals with. I will go through the main global treaties and the main organizations in international environmental law. After this I will go through, also briefly, regional environmental law. I will do this by looking into the organizations that operate in the area and the treaties made.

2.2 International Environmental Legislation

International environmental law is a combination of international law and national environmental law. The mission of international regulation is to promote and standardize adaptation of environmental goals in national judicial systems. The reason that international environmental law has reached a significant status politically is the common need for the international community to reduce the environmental problems on earth, which, as is well known, do not respect the boundaries of nations. The source of international environment law is partly customary law but mainly it relies on agreements. International cooperation is extensive and abundant, because developing environmental principles and making environmental agreements partake in at least these organizations:

- United Nations (UN), and global organizations within the UN system:
    - United Nations Environment Programme (UNEP)
    - United Nations Development Programme (UNDP)
    - United Nations Educational, Scientific and Cultural Organization (UNESCO)
    - World Bank (WB)
    - Global Environment Facility (GEF)
    - The Commission on Sustainable Development (CSD)
- Organisation for Economic Co-operation and Development (OECD)
- Economic Commission for Europe (ECE)

- World Health Organization (WHO)
- Food and Agriculture Organization (FAO)
- World Trade Organization (WTO)
- International Maritime Organization (IMO)

The UN has the most significant part in planning the agreements.
(Hollo 2004, 23.)

International environmental law has been developing gradually throughout the past century. In the early 1970s there was a considerable acceleration in that process. The 1972 Stockholm Conference agreed upon the Stockholm declaration on the human environment. The declaration included a set of guiding principles for the future direction of activities concerning the human environment. Those included matters dealing with economic development and the need for states to take more coordinated action to deal with possible problems. After the Stockholm Conference new conventions came up. Many of them dealt with specific sectoral issues such as: pollution of the seas by ships, trade in endangered species, military environmental modification during times of armed conflict and the conservation of migratory species of wild animals.
(Boer, Ramsay, Rothwell 1998, 3-6)

After the development of international environmental law throughout the 20th century it is now possible to identify the core principles of international environmental law. Those are:

- The obligation of all states to conserve the environment and its natural resources.
- The need for states to assess potential, and monitor actual environmental impact.
- The need for international cooperation to conserve the environment both within and beyond the areas of national jurisdiction.

This list is not exhaustive and it may be possible to identify other principles which are in a state of development or which have particular application for specific environmental problems. The purpose of the list is to provide a general overview.
(Boer, Ramsay, Rothwell 1998, 9-10)

One of the difficulties with international environmental law is with conventions that many are unable to deal with specific regional problems. This is due to the

fact that the conventions are negotiated to deal with global problems which all states face. There are though some conventions that deal directly with regional matters. A good example of this is the 1982 United Nations Conventions on the Law of the Sea.
(Boer, Ramsay, Rothwell 1998, 18-19)
Following is a list of the main global treaties of environmental law:

- 1971 Convention on wetlands of International Importance Especially as Waterfowl Habitat
- 1972 Convention concerning the Protection of the World Cultural and Natural Heritage
- 1972 Convention on the Prevention of Marine Pollution by Dumping of Waste and other Matter
- 1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora
- 1973 Convention for the Prevention of Pollution from Ships
- 1979 Convention on Conservation of Migratory Species of Wild Animals
- 1982 United Nations Convention on the Law of the Sea
- 1985 Vienna Convention for the Protection of the Ozone Layer
- 1989 Basel Convention on the Control on Transboundary Movements of Hazardous Wastes and their Disposal
- 1992 Convention on Biological Diversity
- 1992 Framework Convention on Climate Change

(Boer, Ramsay, Rothwell 1998, xxxiv-xxxv)

2.3 Regional Environmental Legislation

Asia Pacific region is impacted both by global problems and regional. The most important global issues that affect the region are climate change, biodiversity depletion and desertification. Especially climate change has been a matter of concern, because of its impact to the small island states. The main environmental issues that concern the region are: Biodiversity, climate change, population growth, marine environment, national and transboundary pollution and sustainable development.

(Boer, Ramsay, Rothwell 1998, 47-52)

There are four major international organizations which provide the forums for economic and environmental decision making in the South Pacific. Those are:

- South Pacific Commission
- South Pacific Forum
- South Pacific Forum Fisheries Agency
- South Pacific Regional Environment Programme

The one with the most influence is the South Pacific Regional Environment Programme (SPREP). I will present more information about SPREP later in this thesis.

(Boer, Ramsay, Rothwell 1998, 39-41)

Here is a list of the main regional treaties of environmental law:

- 1976 Apia Convention on conservation of nature in the South Pacific
- 1985 South Pacific Nuclear Free Zone Treaty
- 1986 Convention for the Protection of the Natural Resources and Environment in the South Pacific Region
- 1989 Convention for the Protection of Fishing with Long Drift Nets in the South Pacific
- 1993 Agreement establishing the South Pacific Regional Environment Programme
- 1995 Convention to Ban the Importation into Forum Island Countries of Hazardous And Radioactive Wastes Within the South Pacific
- 1993 Memorandum of Understanding on Port State Control in the Asia-Pacific Region

(Boer, Ramsay, Rothwell 1998, xxxvi-xxxvii)

3. ENVIRONMENTAL LEGISLATION CONCERNING SHIP POWER

3.1 General Information

The environmental legislation concerning Ship Power is mainly international. International legislation for the shipping industry is mainly legislated through IMO. Further, it is legislated through conventions and protocols. In this section I will go through the general international environmental legislation of the IMO. I will specially focus on the MARPOL Conventions Annex VI (Prevention of Air Pollution from Ships), which is the legislation that directly concerns Wartsila. This is, of course, due to the fact that when building ship engines Wartsila has to consider this legislation precisely in order to do business. I will introduce the regulated levels of sulphur oxide (SOx) and nitrogen oxide (NOx) emissions into the air.

I will also try to find out about the regional legislation in the South Pacific. In practice this means that I will find out what international instruments of legislation the countries in question have ratified. Due to the nature of the convention treaty legislation, it is only as regulative as how many countries ratify it. There are some laws that are obligatory but a great deal of the legislation depends on voluntary action. There is no international enforcement, except if the member countries voluntarily accept the enforcement.

3.2 International Environmental Legislation

3.2.1 United Nations Convention on the Law of the Sea 1973-1982

United Nations Convention on the Law of the Sea (UNCLOS) is the most comprehensive international instrument dealing with the legislation of the sea. It seeks to establish a legal order for the seas and oceans which will facilitate international communications and will promote the peaceful use of the seas, the equitable and efficient use of their resources, the conservation of their living

resources and the study, protection and preservation of the marine environment. The Convention deals with issues like:

- territorial sea and contiguous zone
- straits used for international navigation
- archipelagic states
- the exclusive economic zone
- the continental shelf
- high seas
- the deep seabed
- marine scientific research

Almost all of these parts contain provisions with references on protecting the marine environment. Part that deals with marine scientific research, specifically deals with this matter. Its principal provision deals with state responsibility and it states that: “States have the obligation to protect and preserve the marine environment.”
(Boer, Ramsay, Rothwell 1998, 125)
The convention does not seek to create a comprehensive regime for all forms of marine pollution, but it does consider basic state obligations to deal with various forms of pollution. These include: pollution from land-based activities, pollution from sea-bed activities within national jurisdiction, deep sea-bed activities beyond national jurisdiction, pollution by dumping, pollution from vessels and pollution form or through the atmosphere. Although many of the provisions in these areas are not conclusive, they have provided a basis for further development of the law through state practice.
(Boer, Ramsay, Rothwell 1998, 126-127)

3.2.2 MARPOL Convention 1973-1978

Before the MARPOL Convention there had already been one major convention which is called the OILPOL Convention in 1954, which addressed the pollution of the seas from oil. The MARPOL Convention is still considered the first significant attempt to start regulating the pollution of the seas. This is why I will skip the OILPOL Convention and start straight from the MARPOL Convention.

The MARPOL Convention is the main international convention that addresses pollution of the marine environment. It prevents pollution by ships from operational and accidental causes. It is originally a combination of two treaties from the 1973 and 1978 and it has been updated through amendments during the years. The MARPOL convention included six technical annexes which I will present later. The aim of these regulations was in preventing and minimizing accidental pollution and the pollution from routine operations of ships.
(IMO 2002.)

Annex I of the 1973 convention incorporated a lot of information from the previous 1954 OILPOL convention to its regulations. The conventions main concern was the operational pollution, which was considered much more threatening than accidental pollution. Other forms of pollution that the convention wanted to address were chemicals, harmful substances carried in packaged form, sewage and garbage. 15 states needed to ratify the convention in order for it to come into force. Only Annexes I and II were compulsory and Annexes III to VI voluntary, but still only 3 states ratified the convention. It looked like 1973 convention would never enter into force despite its importance.
(IMO 2002.)

After the 1976-1977 tanker accidents, IMO held a conference on tanker safety and pollution prevention in 1978. The conference adopted measures affecting tanker design and operation. Those were incorporated into the 1978 protocol relating the 1974 convention on the safety of life at sea (1978 SOLAS Protocol) and to the 1973 convention for the prevention of pollution from ships (1978 MARPOL Protocol). In order to achieve the entry into force the MARPOL Protocol allowed the states to first implement Annex I and gave additional 3 years to implement Annex II. This gave the states time to overcome the technical problems in Annex II.
(IMO 2002.)

2 October 1983 the MARPOL Convention entered into force considering Annexes I and II. 31 December 1988, after achieving sufficient ratifications, Annex V entered into force. 1 July 1992, Annex III covering harmful substances carried in packaged form entered into force. 27 September 2003 Annex IV covering sewage entered into force and the Annex VI, covering air pollution, was adopted in September 1997 and entered into force on 19 May 2005.

(IMO 2002.)

3.2.3 International Convention on Oil Pollution Preparedness, Response and Co-operation, 1990

In July 1989, a conference of leading industrial nations in Paris called upon IMO to develop the measures of prevention of pollution from ships. IMO started the work on November of the same year and planned a draft convention that aimed at providing a global framework for international cooperation in combating major incidents or threats of marine pollution.
(IMO 2002.)
Dealing with pollution incidents by establishing measures were required from parties of the convention. The new requirements were:

- Ships are required to carry a shipboard oil pollution emergency plan
- Ships are required to report incidents of pollution to coastal authorities and the convention details the actions that are then to be taken
- Parties to the convention are required to provide assistance to others in the event of a pollution emergency and provision is made for the reimbursement of any assistance provided.

(IMO 2002.)

3.2.4 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972

24 March 2006 a significant milestone was reached for the protection of the marine environment when the 1996 Protocol to the convention on the prevention marine pollution by dumping of wastes and other matter entered into force.
The new protocol prevents the use of sea as a depositary of waste that isn't on the approved list. This contrasts to the 1972 convention, which allowed the dumping of any waste that wasn't on the banned list. The 1996 protocol gradually overtook the 1972 convention as more and more parties ratified it. The 1996 protocol reflected a more modern and comprehensive agreement on protecting the marine environment from dumping activities and reflected the broader aims of protecting the environment in general.

(IMO 2002.)

Only the dumping of the following materials was approved by the 1996 protocol.

- Dredged material
- Sewage sludge
- Fish waste, or material resulting from industrial fish processing operations
- Vessels and platforms or other man-made structures at sea
- Inert, inorganic geological material
- Organic material of natural origin
- Bulky items primarily comprising iron, steel, concrete and similar harmless materials, for which the concern is physical impact, and limited to those circumstances where such wastes are generated at locations, such as small islands with isolated communities, having no practicable access to disposal options other than dumping.

(IMO 2002.)

The 2006 Amendment to the Protocol allowed the storage of carbon dioxide (CO2) under the seabed and it came into force 10 February 2007. This meant that the basis of an international environmental law on capturing and storing of carbon was created. The aim was to tackle climate change and ocean acidification and also develop low carbon forms of energy. In practice, this would apply to large point sources of CO2 emissions, including power plants, steel and cement works. (IMO 2002.)

3.3 Annexes of the MARPOL Convention

3.3.1 Annex I: Prevention of Pollution by Oil

The 1973 Convention incorporated the OILPOL convention regulation without substantial change to its Annex I. Operational discharges of oil from tankers were allowed only when all of the following conditions were met.

- The total quantity of oil which a tanker may discharge in any ballast voyage whilst under way must not exceed 1/15,000 of the total cargo carrying capacity of the vessel.

- The rate at which oil may be discharged must not exceed 60 litres per mile travelled by the ship.
- No discharge of any oil whatsoever must be made from the cargo spaces of a tanker within 50 miles of the nearest land.

(IMO 2002.)

The movement of cargo oil and its residues from loading to discharging on a tank-to-tank basis is to be recorded in an oil record book. The discharge of oil in any ballast voyage was reduced in a later amendment to 1/30000 of the cargo carried from the previous 1/15000 of the cargo capacity. These criteria applied both to the persistent (black) and non-persistent (white) oils.

(IMO 2002.)

3.3.2 Annex II: Control of Pollution by Noxious Liquid Substances

Annex II details the discharge criteria and measures for the control of pollution from noxious liquid substances carried in bulk. About 250 substances were in the list appended in the convention. Depending on the substance, until certain concentrations and conditions are complied with, the discharge of the substance and its residues is allowed only to reception facilities. No discharge of residues containing noxious substances is permitted within 12 miles of the nearest land. Baltic and Black Sea areas apply more stringent restrictions.

(IMO 2002.)

3.3.3 Annex III: Prevention of Pollution by Harmful Substances in Packaged Form

This is the first of the optional Annexes. The states could choose to accept only the Annexes I and II and nothing else. This is why the other Annexes have taken longer to enter into force. Detailed standards on packing, marking, labelling, documentation, stowage, quantity limitations, exceptions and notifications for preventing pollution by harmful substances are contained in the Annex III. The International Maritime Dangerous Goods (IMDG) Code has, since 1991, included marine pollutants.

(IMO 2002.)

3.3.4 Annex IV: Prevention of Pollution by Sewage from Ships

Annex IV contains requirements to control pollution of the sea by sewage. The discharge of sewage is prohibited, except when the ship has in operation an approved sewage treatment plant or is discharging comminuted and disinfected sewage using an approved system which must be up to certain conditions.
(IMO 2002.)

3.3.5 Annex V: Prevention of Pollution by Garbage from Ships

Annex V deals with different types of garbage and specifies the distances from land and the manner in which they may be disposed of. Perhaps the most important feature of the Annex is the complete ban imposed on dumping all forms of plastic into the sea. There are many special areas in which the regulations are much stringent than normal.
(IMO 2002.)

3.3.6 Annex VI: Prevention of Air Pollution from Ships

This Annex concerns directly Wartsila and therefore I will give special interest to it. The 1997 Protocol sets limits on SOx and NOx emissions from ships exhausts and prohibits deliberate emissions of ozone depleting substances. The new Annex VI includes a global cap of 4.5% m/m on the sulphur content of fuel oil and IMO is responsible on monitoring the sulphur content of fuel.
(IMO 2002.)
Annex VI contains provisions allowing for "Special Emission Control Areas"(SECA) to be established with more stringent control on sulphur emissions. In SECA:s, the sulphur content of fuel oil used on board ships must not exceed 1.5% m/m or alternatively ships must fit an exhaust gas cleaning system or use any other technological method to limit sulphur oxide emissions.
(IMO 2002.)
Annex VI prohibits deliberate emissions of ozone depleting substances, which include halons and chlorofluorocarbons (CFCs). New installations that contain ozone-depleting substances are prohibited on all ships, but new installations

containing hydro-chlorofluorocarbons (HCFCs) are permitted until 1 January 2020. Annex VI sets limits for Diesel engines on NOx emissions. A mandatory NOx Technical Code, developed by IMO, defines how this is to be done. The Annex prohibits incineration of products, such as contaminated packaging materials and polychlorinated biphenyls, on board the ship.
(IMO 2002.)
MARPOL Annex VI will see a progressive reduction in SOx emissions from ships, first reduced to 3.50% (from the current 4.50%), effective from 1 January 2012 and then progressively to 0.50 %, effective from 1 January 2020. The last reduction will be a subject to a feasibility review that will be completed no later than 2018.
(IMO 2002.)
The limits applicable in SECAs will be first reduced to 1.00%, beginning on 1 July 2010 (from the current 1.50 %) and further reduced to 0.10 %, effective from 1 January 2015. Progressive reductions on NOx emissions were also agreed for marine engines. The most stringent control are on so called “Tier III” engines, which means ships that are built after 1 January 2016 and operate on SECAs.
(IMO 2002.)

New Regulations on sulphur emissions	
Global limit sulphur %	Date until applies
4.50 %	until 1.1.2012
3.50 %	from 1.1.2012
0.50 %	from 1.1.2020

This chart demonstrates the global situation. I intentionally left out the regulations of SECAs, because there is no such area in the South Pacific.
(IMO 2002.)
The revised Annex VI will allow for an Emission Control Area to be designated for SOx and particulate matter, or NOx, or all three types of emissions from ships, subject to a proposal from a Party to the Annex, which would be considered for adoption by the Organization, assuming that it is supported by a demonstrated need to prevent, reduce and control one or all three of those emissions from ships. On 1 July 2010 the revised Annex VI will enter into force, under the tacit

acceptance amendment procedure. The earlier Regulations for the Prevention of Air Pollution from Ships entered into force in May 2005 and has so far, been ratified by 53 countries, representing approximately 81.88 % of the gross tonnage of the world's merchant shipping fleet.
(IMO 2002.)
The Marine Environment Protection Committee (MEPC) adopted amendments to the associated NOx Technical Code, to give a revised NOx Technical Code 2008. The amended Code includes a new chapter based on the agreed approach for NOx regulation of existing (pre-2000) engines established in MARPOL Annex VI and provisions for direct measurement and monitoring methods, a certification procedure for existing engines, and test cycles to be applied to Tier II and Tier III engines. IMO Secretary-General Efthimios Mitropoulos hailed the landmark achievement of the new amendments as "a monumental decision in IMO's history, a decision that proves, once again, that the Organization is focused, united and relevant as the international body capable of dealing with all items on its agenda, an organization that sets global standards in a global environment. The revised measures are expected to have a significant beneficial impact on the atmospheric environment and on human health particularly that of people living in port cities and coastal communities."
(IMO 2002.)

3.3.6.1 Wartsila on Annex VI

In April 2008 the IMOs Marine Environment Protection Committee (MEPC) reached a conclusion to revise regulations that are limiting emissions from ships to the air, including exhaust gas emissions from diesel engines. Adoption of these regulations was done in October 2008. 1 July 2010 the new revised Annex VI will enter into force with various requirements entering into force gradually between the years 2010 to 2020. The Environmental Forum of Wartsila has closely followed the progress of the discussions with a special focus on NOx and SOx regulations because of the effects on Wartsilas business. The NOx regulations will enter into force in two phases. The first step on 1 January 2011 is referred to as Tier II, the second step after 1 January 2016 as Tier III. Here is a chart that presents the new regulations on diesel engines concerning NOx emissions.

IMO NOx – Newbuildings – Diesel engines > 130 kW				
	<130rpm	130-2000rpm	>2000rpm	Ships constructed on/or after
Tier I	17.0	45.0^n(-0.2)	9.8	1.1.2000
Tier II	14.4	44^n(-0.23)	7.7	1.1.2011
Tier III	3.4	9^n(-0.2)	2.0	1.1.2016

rpm=rounds per minute, kW=KiloWatt

Tier I and II apply globally and Tier III in designated areas.

(Henriksson 2008.)

Important is that the IMO Tier III limit for NOx means up to 80% reduction from current values. This can be met by using after-treatment methods, like Selective Catalytic Reduction (SCR). Wärtsilä is developing totally new alternative solutions that could be used either independently, or in a combination with already known technologies.

(Henriksson 2008.)

The limits for SOx emissions have been presented earlier. SOx and particulate matter emissions have a direct relation to the content of sulphur in fuel. Using suitable low sulphur heavy fuel oil (LSHFO) or distillate fuels the new regulations on these emission substances can be met. The additional option to meet this limit is by cleaning exhaust gases to the equivalent level compared to emissions with low-sulphur fuel. “This allows the operator to use fuel with higher sulphur content provided that a suitable after-treatment method is used. Exhaust gas scrubbing is one technology to do this, and Wärtsilä started developing this technology already in 2005.”

(Wartsila 2, 2009.)

3.3.6.2 Debate About Annex VI

Now that Annex VI has been adopted it can be amended through proposals to MEPC by States that have ratified the MARPOL Protocol 1997. Some parties have criticized IMO for its slow procedures and as a result there is increasing pressure to radically amend Annex VI. IMO should introduce generally accepted revisions on Annex VI or some States have threatened to start introducing unilateral legislation that might lead to a weakening of the influence of IMO. (Meech, Robin 2005.)

3.4 Environmental Legislation Regionally

Shipping is of vital importance in the south pacific. This is due to the limited resources available. Especially the small island states are dependent on the shipping industry because of this reason. Due to their location the South Pacific states are isolated from other transport possibilities than shipping and air transport. Shipping is of course the main mode of transporting because of its costs compared to air transport and because of its possibility to transport larger quantities of products.

There is a regional convention in the South Pacific area concerning maritime area and the convention is called the SPREP Convention (The 1986 Convention for the Protection of the Natural Resources and Environment of the South Pacific Region). It entered into force 1990. It applies within 200 nautical mile maritime zones established by states in the region and the high seas areas which are enclosed from all sides by the 200 nautical mile zones. Parties of the convention agree to take all appropriate measures in conformity with international law and the convention to three main subjects. These are:

- Prevent, reduce and control pollution of the convention area from any source.
- Ensure sound environmental management and development of natural resources
- Harmonize their policies at the regional level

Most of the countries in question have ratified this convention, but at least Kiribati, Vanuatu and Tonga did not ratify it.

(Boer, Ramsay, Rothwell 1998, 134.)

According to the SPREP Convention the states agree to take all measures in conformity with international law. That is why I will look into the implementation of the international environmental law in the region. Aside to this although some countries did not ratify the SPREP Convention they have ratified many of the International instruments. The way that I research the implementation is by looking to the instruments of international environmental law that the states have ratified. I made a chart of all the instruments concerning the legislation on shipping for the states in question. I will include this chart as Appendix 1. The chart also shows the world status of the instrument: The no. of states that has ratified the instrument and the percentage world tonnage of shipping equipment involved. You can look into this chart, if something is unclear, during the following analysis of each country.

Now I will analyze each country one by one. I will look into what instruments they have ratified or have not ratified and possibly denounced. I will make some comparison among the countries to see if they ratify same instruments or are there any major differences among them. The comparisons are made in order to find out do the smaller countries follow Australia, which is the largest country and due to that has a lot of influence in this area.

3.4.1 Australia

Australia has ratified the most number of the instruments among the countries. It has ratified 42 of the 61 instruments. The fact that Australia has ratified the most among these countries doesn't come as a big surprise, because it is also the most developed country, which usually means that it can "afford" to think about the environment.

The instruments that Australia hasn't ratified are instruments that are fairly small, which means that only a few countries have ratified them and they concern only a small percentage of the world tonnage. The largest instruments that Australia hasn't ratified are the STP agreement 71 and the STP Protocol 73. Those instruments concerned over fifth of the world tonnage and handled the matter of Special Trade Passenger ships.

There are 3 instruments that only Australia has ratified among the countries in the chart. Those instruments are: INMARSAT Amendments 1994: concerning the use of satellites in possible emergencies at sea, FUND Protocol 2003: which concerned matters involving possible compensation in the case of an oil damage and OPRC/HNS 2000: concerning pollution incidents by hazardous and noxious substances. All these 3 instruments are about medium-size instruments if comparing to the world status. They have been ratified by 24-40 countries and they all cover for more than 20 % of the world tonnage.

Australia has only denounced two of the instruments. Those are the CLC Convention 69 and the FUND Convention 71. The CLC convention 69 concerned the matter of Civil Liability for Oil Pollution Damage. The FUND Convention 71 concerned the matter of Establishment of an International Fund for Compensation for Oil Pollution Damage. It looks like all the countries in this region denounced those same 2 conventions. Kiribati, FSM and Solomon Islands didn't denounce but also didn't ratify those. Later on though, all of the countries that initially denounced themselves from the instruments ratified the 1992 protocol with some adjustments. Australia ratified both already 1976 with new protocols.

3.4.2 New Zealand

New Zealand has ratified 30 of the 61 instruments. All of these 30 instruments are also ratified by Australia. Among the 12 instruments that New Zealand has left non-ratified include some major instruments also. These include instruments such as MARPOL Annex IV and New Zealand also left the MARPOL Annex VI 1997 non-ratified.

Few of the biggest ones that New Zealand has yet to ratify are BUNKERS Convention 2001: concerning oil pollution incidents by bunkers and ANTI Fouling 2001: concerning control of harmful anti-fouling systems on ships. Surprising is also the fact that some of the smaller island states have ratified more instruments than New Zealand. At least Marshall Islands, Vanuatu and Tonga have ratified more instruments than New Zealand.

3.4.3 Island States

Generally there is a widespread support among the island states for international conventions dealing with waste and pollution. The reason why so many of the island states have not ratified so many of the conventions is due to perception that developing countries do not have large domestic maritime fleets to regulate. This is why the instruments have little application. However, the MARPOL and London conventions are important to them, because those instruments regulate the marine traffic transiting through Pacific waters.
(Clarke, Millar and Sollberger 2008.**)**

3.4.3.1 Papua New-Guinea

Papua New-Guinea has ratified only 16 of the 61 instruments. They are all instruments that Australia and New Zealand have also ratified. All of the instruments that Papua New-Guinea has ratified are the major ones. Special note is that also Papua New-Guinea has not ratified the MARPOL Annex VI 1997.
Papua New-Guinea has also left some instruments non-ratified that almost all of the other states have ratified. These include all the INMARSAT-instruments and the few LLMC-instruments: concerning limitations of liability for maritime claims and SUA-instruments: concerning suppression of unlawful acts against the safety of maritime navigation.

3.4.3.2 Fiji Islands

Fiji Islands has ratified 16 of the 61 instruments as well as Papua New-Guinea. Fiji Islands has ratified quite different instruments than Papua New-Guinea. The most important difference is that Fiji Islands has not ratified any of the MARPOL-instruments. Fiji Islands on the other hand has ratified the SUA-instruments which were quite big instruments.
Fiji Islands is the only state with FSM that has left all of the MARPOL-instruments non-ratified. A special note is that Micronesia has only ratified 2 instruments. Also Solomon Islands is among the states that has not ratified the MARPOL-instruments, except the MARPOL Annex IV 73-78.

3.4.3.3 Kiribati

Kiribati has ratified 28 of the 61 instruments. This is a little bit less than New Zealand. The instruments Kiribati has ratified are almost same as New Zealand also. Specialty with Kiribati is that it has ratified as many as 3 instruments that none of the other states has ratified. These are: SFV Protocol 93: concerning safety of fishing by vessels, STCW-F Convention 95: concerning standards of training, certification and watch-keeping for fishing vessel personnel and Ballast Water 2004: concerning control and management of ships' ballast water and sediments. Those instruments are quite small though with ratification of countries from 13 to 18 and covering a little bit less than 20% of the world tonnage.
Noticeable is also that Kiribati didn't denounce the two instruments that all the other states in the area denounced, of course excluding FSM and Solomon Islands which anyway ratified only a few instruments. Kiribati just left them non-ratified and ratified them later along the other states.

3.4.3.4 Solomon Islands

Solomon Islands has only ratified 4 of the instruments. These are: STCW Convention 78, MARPOL 73/78 (Annex IV), London Convention 72, and CLC Protocol 92 which are all explained earlier, except the London Convention 72 which amended some of the MARPOL Conventions matters. These are all instruments that almost all the other states have also ratified, excluding few exceptions.

3.4.3.5 Vanuatu

Vanuatu has ratified 41 of the 61 instruments. This is just one short from Australia. They are all almost the same as Australia, the exceptions being that Vanuatu has not ratified some INMARSAT-instruments and on the other hand has ratified PAL-instruments: concerning carriage of passengers and their luggage by sea and some SUA-instruments which Australia had not ratified.

3.4.3.6 Tonga

Tonga has ratified 40 of the instruments. It also has ratified almost all the same instruments as Australia. Noticeable though, is that it hasn't ratified the MARPOL Annex VI 1997-instrument and few others that Australia ratified. Tonga also ratified many of the PAL-instruments same as Vanuatu.

3.4.3.7 Federated States of Micronesia and Marshall Islands

Micronesia has ratified the least amount of instruments from all the states. It has ratified only 2 of the 61 instruments. Those two are: STCW Convention 78 and SUA Convention 88.

Marshall Islands have ratified 41 of the 61 instruments. This is the same number as Vanuatu. Marshall Islands has ratified more of the same instruments as Australia than Vanuatu. It has left few instruments non-ratified that Australia did ratify and has ratified the PAL-instruments that Australia did not ratify, same as Vanuatu.

4. ENVIRONMENTAL LEGISLATION CONCERNING POWER PLANTS

4.1 General Information

In this section I will go through the environmental legislation that concerns Power Plants. The legislation is mostly international and follows the guidelines of the World Bank (WB). Actually the guidelines are under a WB organization named International Finance Corporation (IFC), but they can be referred to as WB/IFC guidelines or most commonly Environmental, Health and Safety (EHS) guidelines. There are specific standards for emission levels and also the ambient air shed quality affects the limits. I will go through them one by one. I will go through the legislation on exhaust gas stack limits, ambient air quality limits and ambient noise limits. The most important exhaust gas emission substances are Sulphur Oxides (SOx), Nitrogen Oxides (NOx), Particular Matter (PM) and also in smaller amounts Carbon Oxides (COx) and Volatile Organic Compounds/HydroCarbons (VOC/HC). I will look into the important ones and also how the conditions might affect power plant-projects.
Secondly I will go through the regional environmental legislation. Most of the countries follow the international guidelines, but Australia and New Zealand have their own standards for ambient air. I will look into the general environmental legislation on each country to find out in what state it is. This is because in the small island states the legislation is fairly limited. I will also look into the current concern of the climate change which is a serious threat in the South Pacific.

4.2 International Environmental Legislation

Modern environmental legislation norms are technique specific. This means that each prime mover has its own regulation. Existing national/international legislation or guidelines with specific emission limits for stationary engine (reciprocating engine) plants can be found in some countries and many countries are in the development phase of such regulations.
(Cimac 2005.)

Environmental issues in thermal power plant projects primarily include the following:

- Air emissions
- Energy efficiency and Greenhouse Gas emissions
- Water consumption and aquatic habitat alteration
- Effluents
- Solid wastes
- Hazardous materials and oil
- Noise

(World Bank Group 2008.)

I will mainly go through the air emissions, energy efficiency and greenhouse gas emissions and shortly the noise emissions, because they directly concern Wartsila. I will also look into the international ambient air quality standards, which affect possible power plant projects and can affect also the emission standards.

4.2.1 Air Emissions

The primary emissions to air from the combustion of fossil fuels or biomass are Sulphur Dioxide (SO2), NOx, PM, carbon monoxide (CO), and greenhouse gases, such as carbon dioxide (CO2). Other substances such as heavy metals, halide compounds, unburned hydrocarbons and other VOCs may be emitted in smaller quantities depending on the fuel type and quality. These may also have a significant influence on the environment due to their toxicity and persistence. SO2 and NOx are also implicated in long-range and trans-boundary acid deposition. The amount and nature of air emissions depends on factors such as the fuel, the type and design of the combustion unit, operating practices, emission control measures and the overall system efficiency.

(World Bank Group 2008.)

Choice of fuel and use of measures to increase energy conversion efficiency will reduce emissions of multiple air pollutants, including CO2, per unit of energy generation. Variety of factors affects optimizing energy utilization. Those are: the nature and quality of fuel, the type of combustion system, the operating temperature of the combustion turbines, the operating pressure and temperature of

steam turbines, the local climate conditions, the type of cooling system used etc. Here are some recommended measures to prevent, minimize and control air emissions:

- Use of the cleanest fuel available.
- Giving preference to high-heat, low-ash and low-sulphur coal.
- Considering beneficiation to reduce ash content.
- Selecting the best power generating technology for the fuel that is used to balance the environmental and economic benefits.
- Designing stack heights according to good international industry practice to avoid high concentrations of emissions at ground level.
- Considering use of combined heat and power facilities

Emissions from a single project should not contribute more than 25% applicable ambient air quality standards to allow additional future sustainable development in the same air shed.
(World Bank Group 2008.)

4.2.2 Control of Sulphur Dioxide

The sulphur content of the fuel and control costs affect the range of options to control sulphur oxides. The choice of technology depends on a benefit-cost analysis of the following things: environmental performance of different fuels, the cost of controls and the existence of a market for sulphur control by-products. Here are some recommended measures to reduce sulphur oxide emissions:

- Use of fuels with a lower content of sulphur.
- Use of lime or limestone in coal-fired fluidized bed combustion boilers to have integrated desulphurization which can achieve a removal efficiency of up to 80-90% through use of fluidized bed combustion.
- Using optimal flue gas desulphurization (FGD), for large boilers using coal or oil and for large reciprocating engines, depending on the plant size, fuel quality and potential for significant emissions of SO2.

(World Bank Group 2008.)

4.2.3 Control of Nitrogen Oxides

Controlling the formation of NOx can be controlled by modifying operational and design parameters of the combustion process. Secondary measures for treatment of NOx from flue gas may be required in some cases depending on the ambient air quality objectives. Here are some recommended measures to prevent, minimize and control NOx-emissions:

- Using low NOx burners with other combustion modifications, such as low excess air (LEA) firing, for boiler plants. It may be necessary to install additional NOx controls for boilers to meet emission limits. A selective catalytic reduction (SCR) system can be used for pulverized coal-fired, oil-fired, and gas-fired boilers or a selective noncatalytic reduction (SNCR) system for a fluidized-bed boiler.
- Use of dry low-NOx combustors for combustion turbines burning natural gas**.**
- Using water injection or SCR for combustion turbines and reciprocating engines burning liquid fuels.
- Optimization of operational parameters for existing reciprocating engines burning natural gas.
- Use of lean-burn concept or SCR for new gas engines.

(World Bank Group 2008.)

4.2.4 Control of Particulate Matter

Particulate Matter (PM) is being emitted from the combustion process, especially when using Heavy Fuel Oil (HFO), coal and solid biomass. Technologies used for particulate removal are fabric filters and electrostatic precipitators (ESP). Whether to use fabric filters or an ESP depends on the fuel properties, the type Flue Gas Desulphurization (FGD) (if used) and ambient air quality objectives. Here are some recommended measures to prevent, minimize and control PM-emissions:

- Installation of dust controls capable of over 99% removal efficiency. Those might be ESPs or Fabric Filters (baghouses), for coal-fired power plants. The advanced control for particulates is a wet ESP, which further

increases the removal efficiency and also collects condensables that are not effectively captured by an ESP or a fabric filter.

- Using loading and unloading equipment that minimizes the height of fuel drop to the stockpile to reduce the generation of fugitive dust and installing of cyclone dust collectors.
- Use of water spray-systems to reduce the formation of fugitive dust from solid fuel storage.
- Use of enclosed conveyors with properly designed, extraction and filtration equipment on conveyor transfer points to prevent the emission of dust.
- Use of full enclosure during transportation and covering stockpiles for solid fuels of which fine fugitive dust could contain vanadium, nickel and Polycyclic Aromatic Hydrocarbons.
- Design and operate transport systems to minimize the generation and transport of dust.
- Storage of lime or limestone in silos with well designed, extraction and filtration equipment.
- Use of wind fences in open storage of coal or use of enclosed storage structures to minimize fugitive dust emissions where necessary and applying special ventilation to prevent dust explosions.

(World Bank Group 2008.)

4.2.5 Control of Greenhouse Gases and Energy Efficiency

Under the United Nations Framework Convention on Climate Change (FCCC) is carbon dioxide (CO2), which is emitted from combustion of fossil fuels. Here are some recommended measures to avoid, minimize and offset CO2-emissions, from new and existing power plants:

- Use of less carbon intensive fuels or co-firing with carbon neutral fuels.
- Where feasible, use of combined heat and power plants.
- Use of higher conversion efficiency technology of the same fuel type/power plant than the average of the country or region. New plants

should be aimed to be in the top quartile. Rehabilitation of existing plants must achieve significant improvements in efficiency.

- Consider efficiency-relevant trade-offs between capital and operating costs which are involved in the use of different technologies. These trade-offs need to be fully examined by the Environmental Assessment (EA).
- Use of high performance monitoring and process control techniques. Those techniques are good design and maintenance of the combustion system. This is done so that the initially designed efficiency performance can be maintained.
- Where feasible arrangement of emissions offsets, including reforestation, afforestation or capture and storage of CO2 or other currently experimental options.
- If feasible, include transmission and distribution loss reduction and demand side measures.

Consider fuel cycle emissions and off-site factors, such as: fuel supply, proximity to load-centers, potential for off-site use of waste heat etc.
(World Bank Group 2008.)

4.2.6 Emissions Guidelines

Emissions levels for the design and operation of each project should be established through the Environmental Assessment (EA) process on the basis of country legislation and the recommendations of Environmental, Health and Safety (EHS) Guidelines as applied to local conditions. The EA should justify the emissions levels selected. The emissions levels of the EHS Guidelines can be consistently achieved by well-designed and well-maintained pollution control systems. Poor operating or maintenance procedures affect actual pollutant removal efficiency and may reduce it to well below the design specification. Dilution of air emissions to achieve EHS guidelines is unacceptable. On the basis of good international industry practise recommendations the compliance with ambient air quality should be assessed.
(World Bank Group 2008.)

4.2.6.1 Emissions Guidelines for Reciprocating Engines

The following chart presents emissions guidelines for reciprocating engines in mg/m^3. These guidelines are applicable for new facilities. EA may justify more stringent or less stringent limits due to ambient environment. Rehabilitating existing facilities case-by-case emission requirements should be established by the EA. EA should also demonstrate that emissions do not contribute a significant portion to the attainment of relevant ambient air quality standards. The guidelines are valid as Dry Gas, Excess O2 content 15%.

Emissions Guidelines for Reciprocating Engines						
Combustion Technology/Fuel	**PM**		**SO2**		**NOx**	
Air Shed Quality	**NDA**	**DA**	**NDA**	**DA**	**NDA**	**DA**
Natural Gas (NG)	N/A	N/A	N/A	N/A	200(SI) 400(DF)	200(SI) 400(DF)
Liquid Fuels (LF) (Plant >50MWth to <300MWth)	50	30	1170 or 2%>S	0,5 % S	1460*, 1850**, 2000 (DF)	400
Liquid Fuels (Plant >=300MWth)	50	30	585 or 1%>S	0,2 % S	740***	400
Biofuels/Gaseous fuels	50	30	N/A	N/A	30% higher limits than for NG and LF	200(SI NG), 400(Other)

NDA=Non-Degraded Air shed, DA=Degraded Air shed,

N/A=not applicable, S=Sulphur, SI=Spark Ignition, DF=Dual Fuel

*Compression ignition, bore size diameter (mm)<400

** Compression ignition, bore size diameter (mm)>=400

***Contingent upon water availability for injection

(World Bank Group 2008.)

4.2.6.2 Emissions Guidelines for Combustion Turbine

The following chart presents emissions guidelines for combustion turbine in mg/m^3 or as indicated. These guidelines are applicable for new facilities. EA may justify more stringent or less stringent limits due to ambient environment. Rehabilitating existing facilities case-by-case emission requirements should be

established by the EA. EA should also demonstrate that emissions do not contribute a significant portion to the attainment of relevant ambient air quality standards. The guidelines are valid at Dry Gas, Excess O2 content 15%.

Emissions Guidelines for Combustion Turbine					
Combustion Technology/Fuel	**PM**		**SO2**		**NOx**
Air Shed Quality			**NDA/DA**		**NDA/DA**
Natural Gas (NG)	N/A	N/A	N/A	N/A	51 (25ppm)
Fuels other than Natural Gas	50	30	Use of fuel 1%>S	Use of fuel 0,5%>S	152 (74ppm)

NDA=Non-Degraded Air shed, DA=Degraded Air shed, N/A=not applicable

(World Bank Group 2008.)

4.2.6.3 Emissions Guidelines for Boiler

The following chart presents emissions guidelines for combustion turbine in mg/m^3 or as indicated. These guidelines are applicable for new facilities. EA may justify more stringent or less stringent limits due to ambient environment. Rehabilitating existing facilities case-by-case emission requirements should be established by the EA. EA should also demonstrate that emissions do not contribute a significant portion to the attainment of relevant ambient air quality standards. The guidelines are valid at Dry Gas, Excess O2 content 3%, except for solid fuels 6%.

Emissions Guidelines for Boiler						
Combustion Technology/Fuel	**PM**		**SO2**		**NOx**	
Air Shed Quality	**NDA**	**DA**	**NDA**	**DA**	**NDA**	**DA**
Natural Gas (NG)	N/A	N/A	N/A	N/A	240	240
Other Gaseous fuels	50	30	400	400	240	240
Liquid fuels (50MWth<plant<600MWth)	50	30	900-1500	400	400	200
Liquid fuels (plant>=600MWth)	50	30	200-850	200	400	200
Solid fuels (50MWth<plant<600MWth)	50	30	900-1500	400		
Solid fuels (plant>=600MWth)	50	30	200-850	200	510*	200

NDA=Non-Degraded Air shed, DA=Degraded Air shed, N/A=not applicable

*or up to 1100 if volatile matter of fuel<10%

(World Bank Group 2008.)

4.2.7 Ambient Air Quality

Projects with significant sources of air emissions and potential for impacts to ambient air quality should prevent or minimize impacts ensuring the following things:

- Emissions do not result in pollutant concentrations that reach or exceed relevant ambient quality guidelines by applying, in the absence of national legislated standards, the current WHO air quality standards or other internationally recognized sources.
- Emissions do not contribute a noticeable portion to the attainment of relevant ambient air quality standards. General rule that the guidelines suggests that 25% of the applicable air quality standards to allow additional future sustainable development in the same air shed.

Impacts should be estimated through qualitative or quantitative assessments at facility level, by the use of baseline air quality assessments and atmospheric dispersion models to assess potential ground level concentrations. When modelling the dispersion, local atmospheric data should be applied. The dispersion model should be internationally recognized or comparable when applied. Selection of the model is dependent on the complexity and geomorphology of the project. Projects located in degraded air sheds should ensure that any increase in pollution levels is as small as feasible. The project should amount to only a fraction of the applicable short-term and annual average air quality standards.

Here is a chart that presents the current standards for ambient air quality. (The chart doesn’t include the interim-targets that can be as many as 3 before applying these guidelines.)

AMBIENT AIR QUALITY GUIDELINES		
	Averaging period	**Guideline value in µg^m3**
sulphur dioxide (SO2)	24-hour	20
	10 minute	500
nitrogen dioxide (NO2)	1-year	40
	1-hour	200
Particulate Matter (PM10)	1-year	20
	24-hour	50
Particulate Matter (PM2.5)	1-year	10
	24-hour	25
Ozone	8-hour daily max.	100

(World Bank Group 2007.)

4.2.8 Ambient Noise

This chart demonstrates the maximum noise emissions levels in decibels (dB). The chart presents noise levels according to location. Measurements are to be taken at noise receptors located outside the project property boundary. There are different regulations during daytime and night-time. Naturally the limits are stricter during night-time and looser during daytime.

Maximum allowable log equivalent (hourly measurements) in dB(A)		
Location	Day (7-22)	Night (22-07)
Residential, Institutional, Educational	55	45
Industrial, Commercial	70	70

(World Bank Group 2008.)

4.3 Environmental Legislation Regionally

If external funding is used the South Pacific states follow mostly the international guidelines for Power Plants. That is why in this section, I will look into the situation of environmental legislation of each country and try to find out at what stage the legislation is at. Only Australia and New Zealand have their own standards for ambient air quality.

South Pacific Regional Environment Programme **(**SPREP) is a regional organisation established to look after the environment in the region. It was established by governments and administrations of the Pacific region. It has grown in the 1980s from a small programme attached to the South Pacific Commission (SPC) into a major intergovernmental organisation charged with protecting and managing the environment and natural resources in the region. It has staff over 70 and it is based in Apia, Samoa.
(SPREP 2003-2009.)
The Pacific island governments became aware of the need for SPREP to serve as the conduit for concerted environmental action at the regional level. SPREP also sends a clear signal to the global community of the deep commitment of the Pacific island governments and administrations towards sustainable development. This signal is clear in the light of the outcomes of the World Summit on Sustainable Development in the form of implementation, the Millennium Development Goals and Declaration, the Barbados Plan of Action and Agenda 21.
(SPREP 2003-2009.)

4.3.1 Australia

The impact of international environmental law in Australia has been considerable. Some of the most significant political and legal debates have concerned the protection of the environment and how Australia should meet its international obligations. This debate will surely continue in the future. International legal measures to protect the environment will continue to have an important influence on Australia. Although Australia has been in some cases a leading nation on environmental issues in the region. Its record is not blemish. The reluctance of Australia to give full effect to internationally agreed targets in reducing greenhouse gases under FCCC indicates a reluctance to fully respect certain international obligations because they might have an effect on Australian economy. Australia has also been reluctant to deal with land-based marine pollution effectively, notwithstanding the effects it might have on Australia's coastal, estuarine and marine environment.
(Boer, Ramsay, Rothwell 1998, 282-283)

There is an organisation that deals only with environmental issues in Australia and New Zealand. It is called The Environment Protection and Heritage Council (EPHC) of Australia and New Zealand. It was established in June 2001 by the Council of Australian Governments (COAG). EPHC addresses broad national policy issues relating to environmental protection, particularly in regard to air, water, and waste matters. It also addresses natural, Indigenous and historic heritage issues. Under the EPHC is the National Environment Protection Council (NEPC). It is a statutory body under the NEPC Acts of the Commonwealth, the states and the territories. The NEPC meets same time with EPHC.
(NEPC 2009.)
In June 1998, the NEPC made the Ambient Air Quality, National Environment Protection Measure (NEPM). It sets uniform standards for ambient air quality. The standards in the NEPM for ambient air quality are presented in the following chart. Please note that the ambient air quality NEPM is currently under review.

Standards and Goal			
Pollutant	**Averaging period**	**Maximum concentration**	**Goal within 10 years maximum allowable exceedences**
Carbon monoxide	8 hours	9.0 ppm	1 day a year
Nitrogen dioxide	1 hour	0.12 ppm	1 day a year
	1 year	0.03 ppm	none
Photochemical oxidants	1 hour	0.10 ppm	1 day a year
	4 hours	0.08 ppm	1 day a year
Sulfur dioxide	1 hour	0.20 ppm	1 day a year
	1 day	0.08 ppm	1 day a year
	1 year	0.02 ppm	none
Lead	1 year	0.50 µg/m3	none
Particles as PM10	1 day	50 µg/m3	5 days a year

(NEPC 2009.)

4.3.2 New Zealand

New Zealand has seen a radical restructuring of the administrative and legislative framework for environmental management and resource use in the last decade.

Environmental law is now largely based on the principle of sustainability, which incorporates considerations of intergenerational equity, preservation and protection of our environment from human activity. It gives respect for the special relationship of Maori with ancestral land and their culture and traditions.

New Zealand's environmental legislation, ranks among the worlds most advanced internationally and attracts the attention of many countries in their attempt to achieve sustainable development.

(The University of Auckland 2009.)

The establishment of The New Zealand Centre for Environmental Law (NZCEL) was established to provide a focal point for research, education, community-service, and a range of environmental law activities in New Zealand and the wider Asia Pacific region. NZCEL maintains close links with relevant institutions, environmental and industry groups.

(The University of Auckland 2009.)

New Zealand has not yet experienced substantial legal or political controversy over implementing international environmental standards, but there is yet to be developed a strong body of legislative provisions to give effect to a number of international environmental law obligations.

(Boer, Ramsay, Rothwell 1998, 283.)

The following chart presents the national ambient air quality standards in New Zealand.

Standards for ambient air quality			
Contaminant	**Standard**	**Time Average**	**Allowable exceedences per year**
Carbon monoxide (CO)	10 mg/m^3	8 hours	1
Nitrogen dioxide (NO_2)	200 $\mu g/m^3$	1 hour	9
Ozone (O_3)	150 $\mu g/m^3$	1 hour	0
Particles (PM_{10})	50 $\mu g/m^3$	24 hours	1
Sulphur dioxide (SO_2)	350 $\mu g/m^3$	1 hour	9
	570 $\mu g/m^3$	1 hour	0

(New Zealand Government 1998-2009.**)**

4.3.3 Island States

There is a growing danger in the Pacific. Many of the Island states are extremely vulnerable to climate change and sea level rise. Island states will be among the first to suffer the impacts of climate change and forced to adapt or abandon or relocate from their environment. Because many of the islands are low lying or because of their coastal features, they are particularly vulnerable to climate change, variability and sea level change. The climate change will also affect biodiversity, soils and the water supplies of small islands. Most of the small island states will find it extremely difficult to adapt to these changing conditions. Because of the low adaptive capacity, high sensitivity to external shocks and high vulnerability to natural disasters, the impacts will be felt for many generations.
(SPREP 2003-2009)

The failure to adapt in these changing conditions now could lead to high social and economic costs in the future. The economic disruption for the low lying atolls could be catastrophic. It might even require population relocation into other islands or increasing the number of people emigrating from the islands. Some areas of the coral reefs may be so weakened by overfishing that they may not be able to recover from bleaching events in the future. Public pressure is growing demanding action on adaptation. There is a growing concern from the governments and communities about the need to reduce the vulnerability of the islands and manage the risks posed by extreme events and long-term change.
(SPREP 2003-2009)

Climate has been recognized as a serious threat to the region. The socio-economic, environmental, physical and cultural damages that climate change will cause on the region are of concern to a great range of stakeholders. The knowledge that there is an opportunity to halt climate change makes the concern so urgent. Yet actions from those who are most responsible for the climate change have been lacklustre at best.
(SPREP 2003-2009)

The region has taken steps on building capacity, after understanding the danger. There is regional and inter-regional cooperation among the islands. These activities in the region have been shaped against the backdrop of international

developments, such as the Bali Action Plan, further elaborated at the Bangkok Climate change talks.

(SPREP 2003-2009)

National environmental legislation in South Pacific island states typically includes:

- Separate legislation on topics such as fishing, forestry, land development, and pollution control.
- Laws implementing certain international conventions.
- A relatively recent and broader environment and planning statute.

Some states, such as Papua New Guinea, also include environmental protection or sustainability objectives in their constitutions. Although. These provisions are generally not enforceable.

(Clarke, Millar and Sollberger 2008.**)**

Many South Pacific states have recently enacted more broadly applicable environmental laws, but the earlier environmental laws in each state tended to be focused on a particular issue. These recently adopted laws have raised substantial controversy and have only been enacted following extended debate. Although the enactment of such legislation indicates a welcome degree of state commitment to environmental protection some issues remain. All of they states don't have legislation that is sufficiently proactive for forward planning for land use and protection. Some regimes respond to development proposals or other environmental issues as they arise, which is a problematic approach because it fails to deal adequately with the cumulative impacts of development.

(Clarke, Millar and Sollberger 2008.**)**

Much of the legislation is 'command and control' in nature, with top-down decision- making. Limited opportunities for community involvement into environmental rules and plans can result in less appropriate or acceptable plans and lower compliance rates. Legislation enforcement resources are also likely to be limited.

(Clarke, Millar and Sollberger 2008.**)**

As stated before, the low lying island nations of the pacific would suffer severe consequences under worst case scenarios of sea level rise. These islands include Kiribati and Marshall Islands. Other Pacific islands would probably experience human migration and loss of agricultural lands and freshwater resources. The

islands that would be least affected include Papua New-Guinea and Vanuatu because they are larger and higher, but also in these islands many people live within a metre or two of sea level.
(Boer, Ramsay, Rothwell 1998, 150-151.)
One way that the Pacific Island nations have also sought to exercise international political leverage in the climate change negotiations is through their Alliance of Small Island States (AOSIS). AOSIS has 45 members, which include all the eight island states researched in this thesis. The original purpose of AOSIS was to provide unity and increase their influence and raise awareness of their concerns in relation to negotiations regarding the FCCC. Now AOSIS has extended its activities to include a range of additional issues concerning small island states.
(Boer, Ramsay, Rothwell 1998, 163.)

4.3.3.1 Papua New-Guinea

Environmental Law Centre (Papua New Guinea) ELC-PNG, Centre for Environmental Law and Community Rights (Papua New Guinea, CELCOR) and the Eco-Forestry Forum work closely on issues of common concern in Papua New Guinea and maintain informal links with public interest environmental lawyers in Australia and South-East Asia, but interaction with environmental organisations in other parts of the South Pacific remains relatively limited. Currently there are no other dedicated public interest environmental law centres established in the South Pacific island states.
(Clarke, Millar and Sollberger 2008.**)**
Here are presented the key features of the national environmental legislation in Papua New-Guinea. The key features have been stated in the Environment Act 2000:

- In accordance with the Fourth National Goal and Directive Principle (National Resources and Environment) of the Constitution to provide for protection of the environment.
- To regulate the environment impacts of development activities in order to promote sustainable development of the environment and the economic, social and physical well-being of people by safeguarding the life-supporting capacity of air, water, soil and ecosystems for present and

future generations and avoiding, remedying and mitigating any unfavourable effects of activities on the environment.

- To provide for the protection of the environment from environmental damage.
- To provide for the management of national water resources and the responsibility of their management.
- To repeal various Acts.

(WHO 2009.)

4.3.3.2 Fiji Islands

Here are presented the key features of the national environmental legislation in Fiji. The key features have been stated in the Environmental Management Act 2005:

- Establishes a National Environment Council, with responsibility for monitoring the implementation of a National Environment Strategy. It ensures commitments made at regional and international levels are implemented. It advises the government on international and regional treaties relating to the environment.
- Requires preparation of certain environmental reports and plans, which include the National State of the Environment Report, National Environment Strategy, Natural Resource Inventory and National Resource Management Plan.
- Formulates procedures for environmental impact assessment of certain proposed developments and provides for certain waste management and pollution control measures, including a permit scheme, improvement and prohibition notices and stop work orders.
- Enables for investigation and prosecution of environmental offences.
- Establishes an Environmental Tribunal to hear appeals under the Act.

(Clarke, Millar and Sollberger 2008.**)**

4.3.3.3 Kiribati

In the following are presented the key features of the national environmental legislation in Kiribati. The key features have been stated in the Environment Act 1999:

- It Aims:
    - To provide for and establish integrated systems of development control, environmental impact assessment and pollution control.
    - To prevent, control and monitor pollution.
    - To reduce risks to human health and prevent the degradation of the environment by all practical means.
    - To protect and conserve the natural resources threatened by human activities.
- The Minister who is responsible for the administration and implementation of the Act is acting in accordance with the advice of the Cabinet. To serve the purposes of the Act, environmental inspectors may be appointed.
- If a person proposes to carry out certain prescribed development in Kiribati, he is required to apply to the Minister.
- Offences are established with respect to pollution, licences to discharge waste, and emitting noise, odour or electromagnetic radiation from a specific premise. Pollution abatement notices or stop notices can be issued.

(Clarke, Millar and Sollberger 2008.**)**

4.3.3.4 Solomon Islands

Next are presented the key features of the national environmental legislation in Solomon Islands. The key features have been stated in the Environment Act 1998. Objectives of the Act are:

- To provide for and establish integrated systems of development control, environmental impact assessment and pollution control.
- To prevent, control and monitor pollution.
- To reduce risks to human health and prevent the degradation of the environment by all practical means.

- To comply with and give effect to regional and international conventions and obligations relating to the environment.

(Clarke, Millar and Sollberger 2008.**)**

4.3.3.5 Vanuatu

Here are presented the key features of the national environmental legislation in Vanuatu. The key features have been stated in the Environment Management and Conservation Act 2002:

- Provides for the conservation, sustainable development and management of the environment of Vanuatu. A Director is appointed to develop, co-ordinate and implement the Government's environmental policies and programs.
- The Director's duties include:
    - Administering the Environmental Registry.
    - Preparing State of the Environment Reports.
    - Preparing National Policies and National Plans.
    - Administering the Environmental Impact Assessment procedure.
    - Preparing guidelines, standards, codes of practice and procedures.
    - Preparing advice on international environmental treaties, including implementation strategies.
    - Undertaking environmental research, assessment, monitoring, and inspection generally.
    - Chairing the Biodiversity Advisory Council (dealing with implementation of the Convention on Biological Diversity (CBD)).
    - Assisting with establishing Community Conservation Areas.
- All development activities which impact, or might impact, on the environment of Vanuatu, and which require any licence, permit or approval under any law, must comply with the Act.
- Various specific environmental offences are punishable by fines or imprisonment.

(Clarke, Millar and Sollberger 2008.**)**

4.3.3.6 Tonga

Here are presented the key features of the national environmental legislation in Tonga. The key features have been stated in the Sixth Development Plan 1991-1996. The sixth Development Plan listed seven national development objectives as the underlying principles within which the various sectors were to formulate their planning decisions. The national development objectives included:

- Achieving sustainable economic growth conducive to higher per capita income.
- Achieving a more equitable distribution of incomes and a more equitable access to goods and services between regional community groups and between income groups.
- Generating more employment opportunities.
- Restoring and controlling external financial balances.
- Enhancing the quality of life by raising health standards, maintaining national security and continuing to promote the cultural heritage of Tonga.
- Developing beneficial relations with other nations.
- Ensuring the continued protection and management of natural resources for sustainable development.

Actually only the seventh objective is the only one that concerns environmental protection directly.
(UNESCAP, 2009.)

4.3.3.7 Federated States of Micronesia and Marshall Islands

The Federated Stated of Micronesia (FSM) and the Marshall Islands have a mutual agreement with the United States on environmental legislation. I will now shortly go through the main points of this agreement.
The three countries state that it is their policy to promote efforts to prevent or eliminate damage to the environment and biosphere and to enrich understanding of the natural resources of the Marshall Islands and the Federated States of Micronesia. In order to carry out this Policy, the Government of the United States

and the Governments of the Marshall Islands and the Federated States of Micronesia agree to some mutual and reciprocal undertakings.

(The Legal Information system of the FSM, 2002.)

The following is to clarify the agreement of the 3 countries:

“The Governments of the Marshall Islands and the Federated States of Micronesia shall develop standards and procedures to protect their environments. As a reciprocal obligation to the undertakings of the Government of the United States under this Article, the Governments of the Marshall Islands and the Federated States of Micronesia, taking into account their particular environments, shall develop standards for environmental protection substantively similar to those required of the Government of the United States by Section 161 prior to their conducting activities in the Marshall Islands and the Federated States of Micronesia, respectively, substantively equivalent to activities conducted there by the Government of the United States and, as a further reciprocal obligation, shall enforce those standards.”

(The Legal Information system of the FSM, 2002.)

The Federated States of Micronesia (FSM) has also passed a resolution in relation to global warming, expressing serious concern over the threat to FSM posed by its effects. It states that continued unrestricted release of greenhouse gases into the atmosphere will accelerate the process of global warming with possible catastrophic consequences to FSM. Through this legislative declaration FSM joins many other island states in the Pacific in an attempt to influence and educate the world community regarding the specific dangers to Pacific island states of the climate change.

(Boer, Ramsay, Rothwell 1998, 260.)

5. FUTURE PROSPECTS OF ENVIRONMENTAL LEGISLATION CONCERNING SHIP POWER AND POWER PLANTS

5.1 General Information

In this section I will go through the researchable future prospects of the environmental legislation concerning Ship Power and Power Plants. I will look into the future prospects of both international environmental legislation and regional environmental legislation concerning both areas. First I will go through Ship Power and then Power Plants.

I will research the subject by interviewing several persons who are experts in the field of environmental legislation. The interviews are done via e-mail, in which there is a questionnaire with questions for each category. I will go through the things I wanted to find out for each category, but the questionnaire can also be found as Appendix 2 in the end and it shows the specific questions. The persons I interview have different fields of expertise and their answers to the questionnaire vary accordingly. With this I mean the answers focus more on their field of expertise. I ask them to comment on the questions if they are unable to answer, if maybe the question is too accurate or perhaps there just is not enough certainty on the matter. I also give them the possibility to tell freely on the subject, in the case I have not realized to ask something important on the subject.

Four experts answer the questions on environmental legislation concerning Ship Power. Two experts and also one of the Ship Power experts answer the questions on environmental legislation concerning Power Plants. The persons who I interview and their occupations and the relation of their occupation to environmental issues will be explained in the following sections. I will explain the background of each person on the section in which questions they answer.

5.2 Future Prospects of Environmental Legislation Concerning Ship Power

5.2.1 Future Prospects Internationally

I want to find out how well the new international regulations will be taken into practice and how will they affect the future of international legislation on marine emissions. I also aim to find out if new Special Emission Control Areas are planned. In this section the interviewed experts are Mr Goran Hellen, Mr Mikko Mannerkorpi, Mr David Weinstein and Mr Darrel Craig. Mr Goran Hellen is a Senior Manager of Marine Regulations and Engine Affairs at Ecotech and his job description is to follow the development of marine emission legislation. Mr Mikko Mannerkorpi is a Business Development Manager at Wartsila, Australia and the relation of his occupation to environmental issues is that: due to increased awareness of environmental matters in Australia, industry operators tend to turn to Original Equipment Manufacturer suppliers for clarification, hence basic knowledge is an asset. Mr David Weinstein is a Senior Adviser Maritime and Freight at the Ministry of Transport of New Zealand. His job description is: Chair Maritime Environment Group, lead policy officer for Ministry on environmental issues pertaining to maritime transport and he mainly answers the questions from the perspective of New Zealand. Mr Darrel Craig is an Engineering Manager at Sanford Limited and the relation between his occupation and environmental issues is that: With ten vessels in operation around New Zealand (NZ) and the world, every change in regulations effects how he does business and he has to find ways to meet new requirements for the vessels.

5.2.2 Future Prospects Regionally

I want to find out how the international legislation will be implemented in the South Pacific area, this includes the question about a possible SECA in the future for the region. I also want to know will the special situation of the South Pacific states affect their implementation or possible development of own regulations. In this section I interview the same four experts as in the previous section.

5.3 Future Prospects of Environmental Legislation Concerning Power Plants

5.3.1 Future Prospects Internationally

I aim to find out how the legislation progresses in the future. I also want to know in what way have the guidelines developed to this point. One of the questions examined the matter of influence of international regulations. Will that remain strong or will they decrease? In this section the experts I interview are Mr. Johan Boij and Mr. Harri Vertanen. Mr Johan Boij is the Senior Manager of Regulations in Wartsila, so he is directly involved especially with the regulations of power plants. Mr Harri Vertanen is the Senior Business Development Manager and the relation of his occupation to environmental issues is that he needs knowledge on environmental issues because they are integrated as a part of his business. Mr. Goran Hellen, who is mainly an expert on marine legislation, also provided some information on the questions he had knowledge of.

5.3.2 Future Prospects Regionally

The aim was to find out will the national standards in the region replace international standards in the future. For this purpose there is a question about concerning the special concern of the region. I also looked into how much the influence of Australia and New Zealand dictates the regulation of the smaller countries in the region. One of the questions examined the matter of possible degraded air sheds in the region. In this section the experts I interviewed were Mr. Johan Boij and Mr. Harri Vertanen as well as in the international legislation concerning power plants.

6. ANALYSIS OF THE INTERVIEWS

6.1 Analysis of the Answers for Ship Power

6.1.1 Analysis of International Future Prospects

The first question examined will the protection of marine environment focus more on land-based pollution in the future. Almost all the interviewees thought that this wasn't true. Mr Hellen also mentioned that the land-based sources have generally tighter emissions limits and that the marine limits are following with a few years lag and it will continue to stay so. Mr Mannerkorpi, on the other hand, thinks that the marine legislation will be heavily influenced by this, although he does mention that marine pollution constitutes of only a small portion of total emissions in the world. Mr Weinstein and Mr Craig simply thought that this will not happen.

(Craig 2009.)

(Hellen 2009.)

(Mannerkorpi 2009.)

(Weinstein 2009.)

The second question handled the implementation of the new regulations on MARPOL:s Annex VI. To this question all the interviewees answered quite differently and from their perspective. Mr Hellen was clear that they will be implemented because the IMO regulations are conventions that have to be implemented into national law. It is obligatory. Mr Mannerkorpi thought that at the moment there are not good enough measurement tools in place for this and he also mentioned that right now Australia is waiting for Tier II to come into effect 2011 and later on Tier III although Tier II does not have a lot of influence, the strict Tier III will have. Mr Weinstein answered on the behalf of New Zealand and said that New Zealand has not ratified Annex VI and has no plans to do so in the future. However, they are considering the impacts of Annex VI for New Zealand. Mr Craig thought that vessels will continue to operate as usual in blue water, but when entering controlled zones they will comply.

(Craig 2009.)

(Hellen 2009.)

(Mannerkorpi 2009.)

(Weinstein 2009.)

The third question studied the claims on new revisions on the MARPOL Conventions Annex VI. All the interviewees agreed that at the moment there will be no major revisions on this. Mr. Hellen answered plainly that there will be no revisions. Only minor details and errors might be changed, but the major issues will stay as they are. Mr Weinstein thought that it is too soon to tell especially with Canada and The United States of America (USA) declaring a SECA. He did think that the timetable might be extended but this will be reviewed earliest in 2015 or in 2018.

(Craig 2009.)

(Hellen 2009.)

(Mannerkorpi 2009.)

(Weinstein 2009.)

The fourth question discussed the threats of national standards if there will be no revisions. Mr. Hellen answered that these threats are typical. Mostly these demands are about CO2-emissions. A few weeks ago the European Union (EU) made a threat to the IMO on CO2. There is a possibility that the EU might act if IMO cannot agree on CO2-reduction, but he does not foresee that any single nation would implement such threats. Also Mr Weinstein thought that the EU will implement its own regulations and Mr Craig also thought that the threats are substantial. Mr Mannerkorpi answered that he does not believe this happening in the Oceania region, although there is the area of the Great Barrier Reef which possibly might boost Australia on this.

(Craig 2009.)

(Hellen 2009.)

(Mannerkorpi 2009.)

(Weinstein 2009.)

The fifth question was about the possible decreasing of IMO:s influence, if such threats will be implemented. All the interviewees agreed that it will not affect the influence too much. Mr. Hellen thought IMO can only fail on CO2, but it will hold the control on SOx, NOx and PM. Mr Mannerkorpi thought that there are already examples of such threats being implemented e.g. in California and

Norway, and those did not have much impact on the influence. Mr Weinstein thought that the threats have helped push IMO to act faster.

(Craig 2009.)

(Hellen 2009.)

(Mannerkorpi 2009.)

(Weinstein 2009.)

The sixth question examined possible new SECA:s. Mr Hellen answered that at the moment there are no NOx Emission Control Areas (NECA) in the world and that the SECA:s right now (North Sea, Baltic Sea, and English Channel) will be also NECA:s in the future. Additionally American and Canadian coastal waters will be SECA and NECA. In Asia only Tokio Bay has been discussed. There have also been some speculations of the Mediterranean and Mexico Waters, but they are still just speculations and no real proposals have been made. Mr Weinstein also mentioned the North America as a new SECA. Mr Craig also thought that new SECA:s will be coming. Mr Mannerkorpi saw the Great Barrier Reef and its surroundings also as a possible SECA in the future.

(Craig 2009.)

(Hellen 2009.)

(Mannerkorpi 2009.)

(Weinstein 2009.)

Mr. Hellen said more Generally about the future prospects that the reviewed IMO regulations will be implemented (NOx, SOx). Additionally there will be a CO2 restriction in form of CO2 trading or alternatively a CO2 cap for ships. Mr Weinstein said that the regulations will continue get more stringent and requirements for better ship designs and new low carbon technologies will follow. Also alternative energy sources to power ships will become more common. Mr Mannerkorpi thought that when we reach Tier II in 2011 we will have a better understanding on how the industry can cope with big changes. Carbon credit scheme has already made marine operators to look for low carbon footprint solutions. Also he though that gas operated engines will be more and more attractive options due to their feasibility and cost values.

(Craig 2009.)

(Hellen 2009.)

(Mannerkorpi 2009.)

(Weinstein 2009.)

6.1.2 Analysis of Regional Future Prospects

The First question examined the matter of possible SECA in the South Pacific region. Almost all the interviewees had not heard about any serious plans. Mr Mannerkorpi mentioned the concern of the Great Barrier Reef surroundings and he continued that currently vessels from Australia go to Antarctica where it is not allowed to burn heavy fuel. Mr Weinstein answered from the perspective of New Zealand and stated that currently air emissions from ships are not a big problem for New Zealand. Mr Craig expressed that there are SECA:s in place around New Zealand and new ones will pop up as time passes.

(Craig 2009.)

(Hellen 2009.)

(Mannerkorpi 2009.)

(Weinstein 2009.)

The second question was that have any of the countries in the region demanded revisions on Annex VI. All the interviewees agreed on this question as far as they knew. No one had heard of such demands from the countries of the region.

The third question continued the second and handled possible threats that the countries might have given if there were such demands. Again all the interviewees agreed that there had been no such threats, as is reasonable to assume, if there have not been any demands as well.

(Craig 2009.)

(Hellen 2009.)

(Mannerkorpi 2009.)

(Weinstein 2009.)

The fourth question addressed the great concern of the region on the climate change and aimed to find out if the concern might affect implementing international laws or possibly the developing of stricter national laws. Mr Weinstein and Mr Hellen agreed on a clear no on this matter. Mr Craig, on the other hand, thought possibly and Mr Mannerkorpi also said that there is a growing awareness in Australia today and the country has also traditionally been the front runner in emission controlling.

(Craig 2009.)
(Hellen 2009.)
(Mannerkorpi 2009.)
(Weinstein 2009.)

About the future prospects of the region in general Mr Hellen said that the new actions taken by the IMO will be followed. Mr Craig also agreed that the new laws will be aligned with those in other parts of the world. Mr Weinstein answered on behalf of New Zealand and thought that eventually New Zealand will become a party of the IMO conventions and he also said that New Zealand is currently making legislation on 4 IMO conventions. New Zealand is also currently looking at MARPOL:s Annex IV and he thought that eventually, but perhaps not under this government, NZ will also look into Annex VI. Mr Mannerkorpi explained that new vessels are being built keeping in mind that emissions will be heavily controlled in the following 10-20 years and even the retail value of old vessels is raising interest to do something about it now.

(Craig 2009.)
(Hellen 2009.)
(Mannerkorpi 2009.)
(Weinstein 2009.)

6.2 Analysis of the Answers for Power Plants

6.2.1 Analysis of International Future Prospects

The first question was on the matter of how the new guidelines have developed from the earlier ones. Mr Boij thought that the new guidelines are tighter but also more logical. By logical he means that the new guidelines give each prime mover their own technique specific emissions limits in all 64 Guidelines due to the “joint implementation” approach of Thermal Power Plant and General EHS Guideline emission limits in all sectors. Mr Vertanen and Mr Hellen also mentioned that the new guidelines are more stringent than the earlier ones. Both Mr Vertanen and Mr Boij considered the new guidelines a big improvement to the earlier guidelines.

(Boij 2009.)
(Vertanen 2009.)

(Hellen 2009.)

The second question was on the matter of air shed quality. I asked if degraded air sheds come by more often. Both Mr Boij and Mr Vertanen pointed out that the bigger projects always need an Environmental Impact Assessment before being implemented. A degraded air shed should be avoided if possible. Through this procedure the development from non-degraded air shed to a degraded is prohibited. Mr Vertanen mentioned that usually the projects that Wartsila is involved in are small and local and do not usually refer to WB limits.

(Boij 2009.)

(Vertanen 2009.)

(Hellen 2009.)

The third question compared the possible national standards and development of those. Mr Boij answered that the EHS Guidelines are appreciated around the world and e.g. in Senegal, Ecuador and India very similar national standards have been developed. He also said that the EU and the US are trying to spread their standards globally. Existing infrastructure of the nation sets the frame for development. Mr Vertanen thought that national standards are usually more stringent than the EHS Guidelines, subject to the existence of national standards of course. Mr Hellen also mentioned that in the EU and the US the standards are already more stringent

(Boij 2009.)

(Vertanen 2009.)

(Hellen 2009.)

Generally about the future prospects Mr Boij thought that Greenhouse Gas (GHG) and Water consumption will become more in to the focus at attention. Mr Vertanen thought that much more will happen in the coming ten years than has happened in the past ten years. He mentioned that if the proposed limits for marine limits will be in force it will have a two-fold impact:

- Power plant limits can not be looser than marine limits, so they will become more stringent.
- If the new marine limits will push to use cleaner fuels the availability of dirtier fuels will reduce due to reduced volume demand. This will make logistics more troublesome in some locations due to oil companies possibly favouring producing cleaner fuels.

Mr Hellen thought that more and more countries will have their own national standards and they will be more stringent.
(Boij 2009.)
(Vertanen 2009.)
(Hellen 2009.)

6.2.2 Analysis of Regional Future Prospects

The first question examined the matter of possible national standards and asked will they become more stringent or looser? Mr Boij pointed out that developing national standards is demanding and always requires the presence of experts. He, therefore, assumed that at least in the US ruled areas EHS guidelines or national standards will be used. He mentions that the use of too strict standards often leads to the use of secondary techniques, but if the infrastructure or knowledge is not in place too strict rules can not be applied. Also Mr Vertanen mentions this matter. He points out that the pacific islands need to look for the most economical power generation facilities, which basically means that they will continue to operate with the cheapest fuels available. No emission limits will stop this.
(Boij 2009.)
(Vertanen 2009.)
The second question concerned the matter of the current concern of the region, which is the climate change and will it affect possible national legislation on power plants. Mr Boij thought that we should see how the Copenhagen meeting goes and he thought that perhaps the possible outcome would be the usage of more renewable energy sources. Mr Vertanen, on the other hand, thought that the concern does not really have much to do with power generation, because it is linked mainly to CO2, but he did mention that some focus may come more on methane- and HC-emissions.
(Boij 2009.)
(Vertanen 2009.)
The third question continued to address the same matter and I asked if the concern of the region will affect possible national legislation, will it address only GHGs or all national environmental legislation? Mr Boij referred to the Copenhagen meeting again and thought that it depends on it and later agreements. He also

mentioned that the used technologies set frames to emission limits. Mr Vertanen answered shortly that it will only affect GHGs.

(Boij 2009.)

(Vertanen 2009.)

The fourth question examineed the matter of air shed quality in the region. I asked if degraded air sheds are coming by more often. Mr Boij answered that air quality standards are becoming stricter in general and that is why this was a relative question. He explained that most environmental rulings have today a demand about the licensing process where an Environmental Impact Assessment (EIA) is to be made so that the impact of new projects can be made and mitigated already from the beginning. He thought we are proceeding into a better direction on that than before. Mr Vertanen answered that he hasn't noticed that degraded air sheds come by with projects in the region and he also did not think that they will be coming by more often in the future.

(Boij 2009.)

(Vertanen 2009.)

The fifth question asked if the smaller countries in the region follow Australia and New Zealand in their legislation. Mr Boij pointed out that Australia has defragmented standards that differ from state to state, so the matter is not very clear. He stated that some consultants try to use Australian standards in some projects so the possibility is there. However, he was sceptical whether the smaller countries can really afford to use these standards. Mr Vertanen said that some islands that are under Australian governance do follow the same standards, but the other smaller countries definitely do not follow Australian standards.

(Boij 2009.)

(Vertanen 2009.)

About the future prospects in the region Mr Boij generally thought that it depends on external funding. If external banks, such as IFC/US/EU, are involved the standards will become more asked also for this area. Mr Vertanen thought that in Australia and New Zealand the legislation will not necessarily become more stringent, except that GHG-case will have some common goals globally. However, there will be targets to generate a certain amount of electricity from renewable resources, which can be seen as related to environmental legislation.

(Boij 2009.)

(Vertanen 2009.)

7. CONCLUSIONS

7.1 General Information

In this section I will make conclusions based on the interviews. I will also try to give my personal opinion on some of the matters. During the research for this thesis I have developed opinions on some of the matters and I will try to give my comment on whether or not I agree with the predictions of the interviewees. Mainly I did agree with the conclusions of the interviewees, but in cases of some disagreements, I will offer my point of view also and perhaps some additional ideas.

7.2 Conclusions of Interviews Concerning Ship Power

7.2.1 Conclusions Internationally

Internationally it seems that the legislation on marine protection will probably not develop so that it will focus more on land-based pollution. However, one of the interviewees thought that land-based pollution will have a great influence on marine protection legislation. I would expand this relatively and say that all pollution will have a great influence on all regulations, because it seems that all regulations will be getting stricter as the general concerns rise. Some disagreement was evident on the implementation of the new regulations of Annex VI. It seems that although the new regulations should be implemented in principle, as they are mandatory, there might not be efficient measurement tools to control pollution in practice, but at controlled zones the controlling is understandably stricter. I believe also that the implementation might not be as efficient as hoped, except in the controlled zones. It can also be concluded through the interviews that the new revisions on Annex VI will not be substantial and only some errors are possibly adjusted. On threats on national standards it seemed that the interviewees believed that at least the EU might act on their threats. However, that these threats are a positive thing, because they could help IMO to act faster. All interviewees also believed that the possible implementing of national

standards will not affect the influence of IMO substantially. This can be concluded already from the fact that it has not done so in the past when national legislations have been made in some countries. One of the interviewees also thought that the only emission area in which the IMO might fail is CO2, but it will hold control on SOx, NOx and PM. Possible new SECA:s that the interviewees believed might become reality are: USA and Canada coastal waters, Mediterranean Sea and Mexico Waters, Great Barrier Reef surroundings and Tokio Bay. I believe that USA and Canada coastal waters are the strongest candidates and due to a report I read, by Meech and Robin, I would also like to add Mediterranean Sea to the list, for at least it has been suggested as an idea to be reckoned with. Additionally, the existing SECA:s which are the North Sea, the Baltic Sea, and the English Channel, were believed to be also NECA:s in the future. Generally for future prospects it seems that carbon emission regulation will become more and more important and new solutions to reduce carbon emissions are becoming more important. This could already be seen to some extent. It also seems that the already existing regulations will continue becoming more stringent. I agree fully with the interviewees on carbon emission controlling becoming more important and also the existing regulations will naturally become more stringent.

7.2.2 Conclusions Regionally

Regionally it seems that there will not be a SECA in the region, although one of the interviewees saw the Great Barrier Reef surroundings as a possible SECA in the future. It can be concluded from the interviews that the countries of the region had not demanded any revisions on the new regulations of the Annex VI, nor had they made or will cause any threats on possible national standards. It also seems that the current concern of the climate change will not really affect the implementing or framing of marine legislation in any way, only Australia was mentioned as a front runner on emission controlling and a possible candidate to act on such matters. I must agree on this matter, because it seems that legislating environmental law is still quite young in the smaller states. Generally it was believed that the new regulations of the IMO will be implemented. It was believed also that the knowledge that emissions will be heavily controlled in the near future will and has already affected the building of new vessels. It could especially be

said on New Zealand that it looks like they will become a more frequent party in the IMO conventions in the future. Right now New Zealand was making legislation for four new conventions and in the future the country will look into MARPOL:s Annex IV and perhaps also Annex VI. In my opinion also only New Zealand seemed to be going the same way as Australia in these environmental issues and is far ahead the smaller states of the region.

7.3 Conclusions of Interviews Concerning Power Plants

7.3.1 Conclusions Internationally

Internationally it seems that the legislation is going towards more stringent regulations. This can be concluded directly from the fact that it has done so during the past ten years. However, there are some problems with the implementation of the legislation. The interviewees thought that the guidelines have developed into a more logical direction. I must agree on this and in my opinion also the development has been substantial to a more logical direction. Through the interviews it can be concluded that the development towards more stringent regulations will be more rapid in the future. However the interviewees were not all that sure how the regulations will be followed. This is because the countries which have problems with economical issues will continue to ignore emission limits and go for the cheapest possible options. The importance of GHG-regulation will increase in the future and also water consumption will become an issue. I think that GHG-regulation will also increase in the future, but in my opinion there are big flaws in the current emission trading system which is not implemented all so well. The largest emitting countries can easily keep on emitting “too much” GHGs because of the emission trading system. I think it is a big flaw in the system, in getting relieves on the emission limits on special projects in developed countries or buying relieves from other countries. Hopefully the Copenhagen Climate Conference 2009 in mid-December will address this matter, but I believe nothing substantial will happen. Generally all the interviewees seemed to agree that the direction is the right one and the legislation will improve and become more stringent in the future.

7.3.2 Conclusions Regionally

Regionally the interviewees agreed that, excluding Australia and New Zealand, the smaller countries will continue to choose the cheapest options due to their problems with infrastructure. The small island states do not have their own emission ruling. It also seems that the current concern of the climate change affects the region so that power generation will look more and more into renewable energy sources and the region will follow common global goals in preventing the greenhouse-affect. I also believe the climate change will have a positive effect on using renewable energy sources in the small island states. The subject will become too important to them soon, but I also think that it is easy for them to ignore the concern, because in the end these small states do not have a big effect on the global situation. It looks like Australia has some effect on the environmental legislation in the region to some islands which they govern, but most of the islands can not afford to follow its standards. Generally there was some hope among the interviewees that the small island states of the region will follow international or national guidelines more and more in the future, but this is dependent on factors such as external funding and economic development. I also share this hope and also believe that it is directly related to the matter of economic development. On Australia and New Zealand could be concluded that the legislation does not necessarily become more stringent in the near future but the use of renewable energy sources will be increasing.

8. SUMMARY

The theoretical study of the thesis started out by introducing environmental legislation generally and then moved on to introduce environmental legislation concerning Ship Power and finally environmental legislation concerning Power Plants. In all these sections the study considered both international and regional legislation. It introduced the state of the legislation now and also how it has progressed to this point. In the empirical study, the thesis introduced possible future prospects of environmental legislation, again both from international and regional point of view. The study was limited to environmental legislation concerning Ship Power and Power Plants. These prospects were researched through interviews with specific questions, but also giving a possibility for free speech and opinions. Six experts answered the questions according to their field of expertise. This means that some were experts on questions concerning Ship Power and some concerning Power Plants and also some had more information regionally and some internationally. Finally conclusions were made based on the answers on the interviews.

The main problem of the thesis was to find out possible outcomes of environmental law in the areas mentioned previously. I believe that the reliability of the thesis is good. Of course, the nature of predicting the future, in any case, is always questionable, but the goal was to find different possible outcomes, not exact predictions. I believe this goal was achieved. I think that the number of the interviewees was adequate and the fields of expertise of the interviewees covered all the subjects of the thesis. The answers given also assure me that the reliability is high, because after researching the matters myself I could also agree on the interviewees with questions which I had some view on. The answers also did not contradict much which also adds to the reliability. Only on few occasions there were some contradictions, which are noted in the thesis.

I think the usability of the thesis is adequate. Mainly it serves the interests of Wartsila, as it was done by their assignment. It should serve the cause of developing the business of Wartsila as environmental issues are an important part of Wartsila’s business. The thesis can give information on which kind of environmental matters should be taken into consideration now and in the future

when designing new power solutions and what kind of environmental issues are important to the South Pacific region when doing business there. Additionally, I believe that the usability of the thesis does expand further and it delivers some information for anyone who needs information on environmental legislation. For example it could give information on environmental law of the South Pacific and the environmental concerns of this area to anyone who needs that information. Further studies on the subject can be almost endless by expanding the field of research. Few examples might be to research the future of international environmental legislation in general or perhaps to look more into the effects of the climate change on the region and possible tightening of the legislation when the effects start showing.

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APPENDIX 1

Status of the IMO Legislation-Instruments by the South Pacific States.

#	Name of convention	Australia	New Z.	Papua N-G	Fiji	Kiribati	Marshall Isl.	Vanuatu	Tonga	FSM	Solomon Isl.	No of States	%-Tonnage
1	IMO Convention 48											168	97.22
2	IMO Amendments 91												
3	IMO amendments 93												
4	SOLAS Convention 74											159	99.04
5	SOLAS Protocol 78											114	96.16
6	SOLAS Protocol 88											94	93.96
7	Stockholm Agreement 96											11	8.59
8	LOAD LINES Conv. 66											159	99.02
9	LOAD LINES Prot. 88											90	94.25
10	Tonnage Convention 69											150	98.99
11	COLREG Convention 72											153	98.36
12	CSC Convention 72											78	60.95
13	CSC amendments 93											9	6.18
14	SFV Protocol 93											17	19.78
15	STCW Convention 78											153	99.01
16	STCW-F Convention 95											13	5.33
17	SAR Convention 79											95	59.76
18	STP Agreement 71											17	23.98
19	STP Protocol 73											16	23.33
20	Inmarsat Convention 76											93	93.25
21	Inamarsat OA 76											89	91.63
22	Inmarsat amendments 94											40	26.91
23	Inamarsat amendments 98												
24	IMSO amendments 2006											1	0.37
25	Facilitation Convention 65											114	90.31
26	MarPol 73/78 (Annex I/II)											150	99.14
27	MarPol 73/78 (Annex III)											133	95.76
28	MarPol 73/78 (Annex IV)											124	81.62
29	MarPol 73/78 (Annex V)											139	97.18
30	MarPol Prot. 97 (Annex VI)											56	83.46
31	London Convention 72											86	67.09
32	London Con. Protocol 96											37	32.22
33	Intervention Conv. 69											86	74.40
34	Intervention Protocol 73											53	48.67
35	CLC Convention 69											38	2.80
36	CLC Protocol 76											53	56.41
37	CLC Protocol 92											122	96.70
38	FUND Convention 71												
39	FUND Protocol 76											31	47.33
40	FUND Protocol 92											104	94.17

41	FUND Protocol 2003											25	20.23
42	Nuclear Conv. 71											17	20.38
43	PAL Convention 74											32	40.80
44	PAL Protocol 76											25	40.46
45	PAL Protocol 90											6	0.85
46	PAL Protocol 02											4	0.17
47	LLMC Convention 76											52	49.08
48	LLMC Protocol 96											35	40.52
49	SUA Convention 88											154	93.45
50	SUA Protocol 88											143	88.28
51	SUA Convention 2005											9	6.01
52	SUA Protocol 2005											7	5.87
53	Salvage Convention 89											58	47.33
54	OPRC Convention 90											100	68.2
55	HNS Convention 96											14	13.61
56	OPRC/HNS 2000											24	32.83
57	Bunkers Conv. 01											45	79.15
58	Anti Fouling 01											40	67.83
59	Ballast Water 2004											18	15.36
60	NAIROBI WRC 2007											1	0.07
61	HONG KONG SRC 2009											-	

Green= ratified

Blank= not ratified

Red= denounced

(IMO 2002.)

APPENDIX 2

INTERVIEW-QUESTIONNAIRE

1. Background:

1. Name:
2. Occupation:
3. Relation of occupation to environmental issues:

2. Environmental legislation concerning Ship Power:

2.1 Future Prospects of International Legislation:

1. Is it true that the international protection of the marine environment is concentrating more on land-based pollution in the future?
2. How well the new adjusted regulations in the IMO:s, MARPOL Annex VI will be followed/implemented?
3. Some countries have demanded revisions on the new regulations of the Annex VI. Are these revisions likely to happen?
4. Some countries have threatened to regulate national standards if there will be no revisions to the regulations. Is this threat substantial?
5. If it is, how would this affect the influence of the IMO?
6. Has there been talk about any plans of new Special Emission Control Areas (SECA)?
7. (Free Speech) What do you believe will happen in the future of international environmental legislation concerning Ship Power?

2.2 Future Prospects of Legislation in the South Pacific:

1. Has there been talk about a Special Emission Control Area (SECA) in the South Pacific?
2. Have any of the countries in the region demanded revisions on the new regulations of the Annex VI?

3. If there has been demands, has there also been threats of own national standards?

4. Does the current concern of the region (great concern of the climate change) affect the implementation of the international legislation or developing of possible national laws?

5. (Free Speech) What do you believe will happen in the future of environmental legislation in the South Pacific concerning Ship Power?

3. Environmental Legislation Concerning Power Plants:

3.1 Future Prospects of International Legislation:

1. How the new World Banks 2008 guidelines have developed from the earlier 1998 guidelines?

2. The guidelines give different limits to degraded and non-degraded air sheds. Do degraded air sheds of possible power plant project locations come by more often?

3. Will the international emission limit standards be replaced by national standards in more countries? In other words, are countries legislating stricter national standards?

4. (Free Speech) What do you believe will happen in the future of international environmental legislation concerning Power Plants?

3.2 Future prospects of Legislation in the South Pacific:

1. The region mostly follows international standards. Will there be stricter national standards?

2. Does the current concern of the region (great concern of the climate change) affect the implementation of the international legislation or developing of possible national laws?

3. If so, will it affect only legislation concerning “Greenhouse Gases” or will it affect all environmental legislation in the region (especially legislation on all emission limits)?

4. Do degraded air sheds come by often in the region and if so are they coming by even more often now/future?

5. Do the smaller countries in the region follow Australia and New Zealand in developing environmental legislation?

6. (Free speech) What do you believe will happen in the future of environmental legislation in the South Pacific concerning Power Plants?